

**Practice: 606 - Subsurface Drain****Scenario: #1 - Corrugated Plastic Pipe, Single Wall, Less than or equal to 6 inches****Scenario Description:**

A perforated HDPE (Corrugated Plastic Pipe) pipeline less than or equal to 6 inches in diameter is installed below ground using a drainage plow to address excess water (seasonal high water table), degraded plant condition, and water quality degradation (nutrients).

Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

**Before Situation:**

Soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations.

**After Situation:**

A perforated HDPE (Corrugated Plastic Pipe) pipeline less than or equal to 6 inches in diameter is installed below ground using a drainage plow to address excess water (seasonal high water table), degraded plant condition, and water quality degradation (nutrients). A 5" single wall, perforated HDPE Corrugated Plastic Pipe (CPP) is installed below ground to a minimum depth of 5 feet. The typical number of mainline connections for 1,000 feet of subsurface drainline is 3. The drainage modifications result in reduced plant stress due to excess wetness or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** Feet of Pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$5,042.50

**Scenario Cost/Unit:** \$5.04

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, tile line plowing, earth, 60"	1457	Plowing in 3"-15" CPP drain line into earth, 60" depth, includes equipment and labor for trenching, laying, and backfilling.	Foot	\$2.56	1000	\$2,560.00
<b>Materials</b>						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	\$31.20	3	\$93.60
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	\$1.48	500	\$740.00
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$283.39	2	\$566.78
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$541.06	2	\$1,082.12

**Practice: 606 - Subsurface Drain****Scenario: #2 - Enveloped Corrugated Plastic Pipe, Single Wall, Less than or equal to 6 inches****Scenario Description:**

A perforated HDPE (Corrugated Plastic Pipe) pipeline less than or equal to 6 inches in diameter is installed with a sand-gravel envelope below ground using a drainage plow to address excess water (seasonal high water table), degraded plant condition, and water quality degradation (nutrients).

Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management, Grass Waterway; 412, 620- Underground Outlet; 313-Waste Storage Structure

**Before Situation:**

Soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations.

**After Situation:**

A perforated HDPE (Corrugated Plastic Pipe) pipeline less than or equal to 6 inches in diameter is installed with a sand-gravel envelope below ground using a drainage plow to address excess water (seasonal high water table), degraded plant condition, and water quality degradation (nutrients). A 5" single wall, perforated HDPE Corrugated Plastic Pipe (CPP) is installed below ground to a minimum depth of 5 feet. The line is surrounded with a sand-gravel envelope. The typical volume sand-gravel for 1,000 feet of 12" wide x 12" high envelope is 32 cubic yards. The typical number of mainline connections for 1,000 feet of subsurface drainline is 3. The drainage modifications result in reduced plant stress due to excess wetness or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** Feet of Pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$6,047.30

**Scenario Cost/Unit:** \$6.05

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Trenching, Earth, 12" x 60"	1459	Trenching, earth, 12" wide x 60" depth, includes equipment and labor for trenching, laying 3"-6" CPP drain line with envelope, and backfilling.	Foot	\$2.07	1000	\$2,070.00
Track Loader, 95HP	935	Equipment and power unit costs. Labor not included.	Hour	\$97.34	4	\$389.36
<b>Labor</b>						
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$27.88	4	\$111.52
<b>Materials</b>						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	\$31.20	3	\$93.60
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	\$1.48	500	\$740.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.06	32	\$993.92
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$283.39	2	\$566.78
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$541.06	2	\$1,082.12

**Practice: 606 - Subsurface Drain****Scenario: #3 - Corrugated Plastic Pipe , less than 8 inches, Buried 8 feet or more****Scenario Description:**

A perforated HDPE, Corrugated Plastic Pipe is installed with a stone drain using a hydraulic excavator. The depth of excavation can range from 8 to 15 feet deep. The drain is installed upslope of a proposed waste storage facility to intercept subsurface water flow. Failure to collect the flow could impair the integrity of proposed waste storage facility.

Associated Practices: 313 - Waste Storage Facility, 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management, 620 Underground Outlet.

**Before Situation:**

Soil conditions are excessively wet in the spring due to poor internal soil drainage. An earthen waste storage facility is planned, which will be vulnerable to failure from excess soil water upslope of the impoundment.

**After Situation:**

A 4" perforated HDPE (Corrugated Plastic Pipe) pipeline is installed with a stone drain using a hydraulic excavator. A 12 feet deep trench is backfilled with a gravel drain. The drain is 2 feet wide by 8 feet high and runs the length of the project. The drainage modifications result in reduced risk of failure of the waste storage facility since the excessive moisture is now collected and carried around the structure to a safe outlet.

**Scenario Feature Measure:** Feet of Pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 500

**Scenario Cost:** \$13,509.60

**Scenario Cost/Unit:** \$27.02

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Hydraulic Excavator, 2 CY	932	Track mounted hydraulic excavator with bucket capacity range of 1.5 to 2.5 CY. Equipment and power unit costs. Labor not included.	Hour	\$209.57	12	\$2,514.84
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$20.29	8	\$162.32
Equipment Operators, Heavy	233	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$27.88	12	\$334.56
<b>Materials</b>						
Pipe, HDPE, corrugated single wall, ≤ 12" weight priced Compound	1380	High Density Polyethylene (HDPE) compound manufactured into single wall corrugated pipe or tubing. Materials only.	Pound	\$1.48	150	\$222.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$31.06	296	\$9,193.76
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$541.06	2	\$1,082.12